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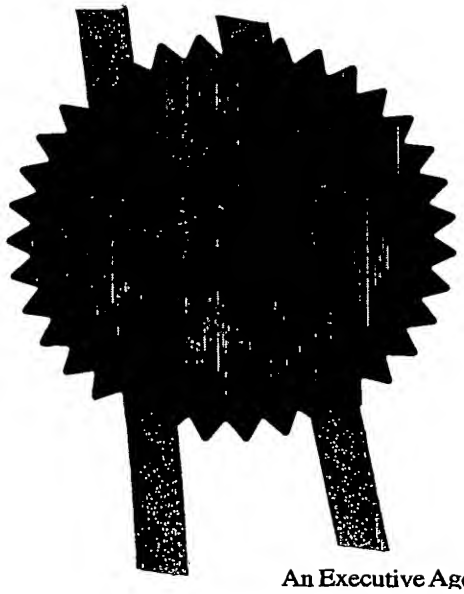

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# Request for grant of a patent

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1. Your reference — FIND / P28765GB

2. Patent application number *(The Patent Office will fill in this part)* — ~~15JUL03 E822701 1 D02066~~ P01/7700 0.00-0316517.2

3. Full name, address and postcode of the or of each applicant *(underline all surnames)*

   **Finden Coatings Limited**
   Karlsruhe House
   Queensbridge Road
   Nottingham NG2 1NB
   United Kingdom

   0316517.2

   06858674001
   Patents ADP number *(if you know it)*

   If the applicant is a corporate body, give the country/state of its incorporation — United Kingdom

4. Title of the invention — HOLD-UP HOSE

5. Name of your agent *(if you have one)*

   "Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*

   **ERIC POTTER CLARKSON**
   **PARK VIEW HOUSE**
   **58 THE ROPEWALK**
   **NOTTINGHAM**
   **NG1 5DD**

   Patents ADP number *(if you know it)* — **1305010**

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number

| Country | Priority application number *(if you know it)* | Date of filing *(day / month / year)* |
|---|---|---|
| GB | 0306131.4 | 18/03/2003 |

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

| Number of earlier application | Date of filing *(day / month / year)* |
|---|---|
| | |

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? *(Answer 'Yes' if:* — YES

   a) *any applicant named in part 3 is not an inventor; or*
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| Priority Documents | 0 |
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| Statement of inventorship and right to grant of a patent *(Patents Form 7/77)* | NO |
| Request for preliminary examination and search *(Patents Form 9/77)* | NO |
| Request for substantive examination *(Patents Form 10/77)* | NO |
| Any other documents *(please specify)* | 23/77 Form 1 |

11. I/We request the grant of a patent on the basis of this application.

Signature Eric Potter Clarkson Date 15 July 2003

**ERIC POTTER CLARKSON**

12. Name and daytime telephone number of person to contact in the United Kingdom 0115 9552211

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# HOLD-UP HOSE

This invention relates to hold-up hose, in particular stockings or half-hose such as a knee-high

Narrow fabrics comprising friction-generating materials are used to attach garments and accessories onto the body. For example, in hosiery elastomeric narrow fabrics retain "stay-up" stockings in position.

This is currently achieved by forming around the internal opening of the stocking one or more annular bands of a silicone elastomer having a high coefficient of friction and a high modulus of elasticity. The bands act to hold up the stocking by applying a constrictive force, such as that generated from an elasticated ring or strap in order to maximise frictional grip.

While the above may achieve good garment positioning, it is undesirable as it can also cause discomfort and pain to the wearer. After an extended wearing period, and/or if the annular band of elastomer is a particularly tight fit, the narrow band will press into the wearer's flesh causing pain, localised temporary damage and reduced blood circulation.

According to one aspect of the invention there is provided a hose having a tubular body formed from a fabric, the tubular body having at one end a leg opening, the fabric in the region of the leg opening being provided with an adhesive coating capable of adhering to the skin of a wearer.

The fabric in the region of the leg opening may be a woven, a non-woven or a knitted fabric. The knitted fabric may be knitted from non-elastomeric yarns only such as polyamide or polyester or may be knitted incorporating



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elastomeric yarns such as an elastane in order to provide the fabric with a desired modulus of elasticity.

Various aspects of the invention are hereinafter described with reference to the accompanying drawings, in which –

Figure 1 is a schematic perspective view of a first embodiment according to the invention;

Figure 2 is a schematic perspective view of a second embodiment according to the invention;

Figure 3 is a schematic perspective view of a third embodiment according to the invention;

Figure 4 is a schematic side view of the production of an adhesive fabric strip 10 for incorporation into the first embodiment of the invention.

A hose 30 according to a first embodiment of the invention is illustrated in Figure 1, a hose 50 according to a second embodiment of the invention is illustrated in Figure 2 and a hose 70 according to a third embodiment of the invention is illustrated in Figure 3. Parts common to all embodiments are defined by the same reference numerals.

The hose 30 includes a tubular body 32 which is preferably closed at one end to define a first accommodating region 34. The opposite end of the tubular body 32 is open to define a leg opening 36.

On the interior of the tubular body 32 and located in the vicinity of the leg opening 36 there is provided an adhesive coating 20.

In the embodiment of Figure 1, the adhesive coating 20 is arranged to define a continuous band 22 which extends circumferentially about the leg opening 36.



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In the second embodiment 50 illustrated in Figure 2, the coating 20 is arranged in a series of discrete regions 24 of adhesive; the discrete regions 24 being spaced about the circumference of the leg opening 36.

The adhesive coating is preferably formed from a pressure sensitive adhesive which preferably remains permanently tacky; in other words an adhesive which can be adhered and removed to a surface many times. Preferably the adhesive also provides an adhesive bond which is strongly resistive to shear forces but which is relatively weak to peel forces. The coating 20 may be applied so as to define a continuous layer of adhesive or alternatively a discontinuous layer of adhesive, i.e. the layer may contain small holes to thereby provide the layer with a desired degree of air permeability.

Preferably the adhesive coating 20 is defined by a silicone gel (as hereinafter more fully described).

Alternatively, the adhesive coating 20 may be defined by an acrylic pressure sensitive adhesive such as a water based acrylic pressure adhesive, e.g. "tackwhite A4 MED" as supplied by Ichemco Srl, Italy.

The area of fabric coated with the adhesive coating 20 is chosen such that the desired degree of support may be achieved taking into account the resistance to shear provided by the adhesive. Typically for stockings, it is expected that the band 22 will have a width within the range of 10 to 60 mm.

Typically for knee-highs, it is expected that the band 22 will have a width within the range of 5 to 30.



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It is envisaged that the region of fabric 28 which carries the adhesive coating 20 and which defined the leg opening 36 may be a separate strip of fabric, such as a lace strip or a strip of plain fabric, which is attached to the remainder of the tubular body 32 for example by a seam or may be a region of fabric which is integrally formed with the remainder of the tubular body 32.

Preferably the region of fabric 28 defines a leg opening 36 which has a diameter substantially the same as, or slightly smaller than, the diameter of leg on which the hose 30, 50 is intended to be worn.

Adoption of this size of leg opening 36 provides little or no compression on the wearer's leg and thereby avoids medical problems associated with a constrictive band. With such an arrangement, support of the hose on the wearer is predominantly achieved by the adhesive contact of the adhesive coating 20 with the wearer's skin.

It is envisaged that the diameter of the leg opening 36 may be slightly greater than the diameter of the leg of the wearer. The extend to which the diameter of leg opening 16 may be greater than the leg of the wearer is determined more by the acceptability of the fit of the hose rather than the hold-up function (i.e. if the diameter is too large, folds will be created around the leg of the wearer). Such a hose is, however, within the ambit of the present invention.

Since the hold-up function is predominantly determined by the adhesive contact between the wearer's skin and coating 20, it is envisaged that fabric region 28 may simply be formed from a fabric having a sufficient degree of stretch to enable the hose to be fitted onto the leg of the wearer.



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Accordingly, the fabric region 28 may be formed of a fabric having no elastomeric yarns, e.g. it may be a fabric knitted entirely of non-elastomeric yarns such as a polyamide or a polyester.

Alternatively, the fabric may incorporate elastomeric yarns in order to provide a desired amount of elastic recovery or modulus of elasticity.

In this respect, it is envisaged that, when using an adhesive such as silicone gel, the fabric region 28 may impart a relatively high compressive force and still provide an improve hold-up function. The utilisation of a silicone gel enables this to be achieved due to the cushioning affect of the gel (i.e. the gel spreads the compressive load of the fabric and helps reduce its constrictive effect).

This is advantageous in the production of hose since it enables a single size of hose to be worn by a wide range of differently sized wearers. In other words, the same size of hose may be worn by wearers having a leg diameter less or more than the diameter of the leg opening.

For the case where the wearer has a leg diameter greater than the diameter of the leg opening 16, the problem associated with roll over (i.e. where the end of the tubular body is caused to roll upon itself) is avoided by the adhesive contact between coating 20 and the wearer's skin.

It will be appreciated that tubular body 32 may be relatively short to define a sock.

Also, tubular body 32 may be open ended in foot region 34.



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In embodiment 70 illustrated in Figure 3, the fabric of the tubular body 32 is knitted including an elastomeric yarn so as to define a compressive support stocking. The fabric region 28 is a separate band of fabric, preferably elasticated, which extends only partially around the circumference of the leg opening 36.

A V-shaped gusset insert 73 formed of a non-elasticated fabric is incorporated into the upper region of the tubular body 32.

The adhesive fabric 10 illustrated in Figure 4 comprises a fabric substrate 11 coated on one side with a layer of a barrier material 12 which is in turn coated with a layer of an adhesive silicone gel 13.

This construction allows for only one side of the fabric substrate to exhibit adhering properties and avoids known problems of adhesive substances undesirably seeping through to the other side of the fabric. The layer of barrier material 12 lying between the fabric substrate 11 and silicone gel layer 13 prevents the transfer of silicone gel into the fabric.

The silicone gel 13 is of a type known as RTV 2K GEL TP 3841™ or "SILOPREN" gel TP 3904 as sold by GE Bayer Silicones GmbH & Co. KG. In its mixed state its viscosity is about 7500 MPas. This silicone gel exhibits an appropriate degree of stickiness that allows the adhesive fabric to be easily peeled off the body without being too adhesive or not adhesive enough.

The thickness of the silicone gel layer is preferably chosen to provide a desired degree of adhesion to, for example, the skin of a body. Generally, the adhesive power is a function of thickness, viz. the thicker the layer of silicone gel, the greater the adhesive power.



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Typically, the thickness of the silicone gel layer is chosen to be in the range of 0.01 to 0.5 mm, more preferably 0.2 to 0.4 mm, more preferably 0.3 to 0.33 mm.

Silicone gels are very suitable for direct use against the skin. Their soft nature encourages a cushioning effect and reduces pressure on the wearer.

The gel also permits a degree of 'creep' when the fabric is adhered to the wearer i.e. slight movement of the fabric across the skin of the wearer.

Silicone gels are further capable of absorbing then slowly releasing a 'carried' solution such as antiseptic medication, vitamins and medicaments used in transdermal drug delivery.

After repeated wear, the stickiness of the adhesive gel may deteriorate particularly as it attracts dust, dead skin cells and other particles. However, the adhesive qualities of the adhesive fabric can be re-generated by washing the adhesive fabric (or garment) in a conventional manner. It is estimated that the adhesive fabric can be washed up to fifty times and still retain a satisfactory and workable level of adhesion.

The barrier material 12 is preferably a silicone elastomer that is compatible with the fabric substrate for ensuring a strong bond between them. The barrier material is also preferably quick to cure thereby enabling the uncured barrier material to be extruded into the fabric substrate and cured before it penetrates too deeply into the fabric structure. Accordingly after application and curing of the barrier material, it will not have penetrated through to the opposite surface of the fabric. In its uncured state the barrier



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material preferably has a viscosity of about 30,000 to 180,000 MPas, more preferably 50,000 to 150,000 MPas.

The fabric substrate 11 may be any type of knitted, woven or non-woven fabric made from natural and/or man made fibres.

The thickness of the barrier layer is preferably chosen to be sufficient to ensure that an impervious layer is formed. Accordingly, for fabric substrates which are smooth and non-hairy, a thinner barrier layer may be adopted compared to a fabric having a rough and/or hairy surface. For fabrics having a hairy surface, it is desirable for the barrier layer to be thick enough to encapsulate therein the surface hairs in order to prevent the hairs acting as wicks.

The barrier layer 12 is preferably a silicone elastomer and may be chosen to be of a thickness to enhance the stretch recovery capabilities of the fabric substrate to which it is applied. Alternatively the thickness of the layer may be chosen such that they do not enhance the stretch recovery of the underlying fabric, i.e. the fabric's stretch recovery properties are not materially affected by the applied barrier layer.

Typically, it is envisaged that the barrier layer will have a thickness in the range of 0.05 to 0.5 mm, more preferably in the range of 0.1 to 0.3 mm, more preferably 0.15 to 0.225 mm.

Figure 4 schematically illustrates the production of the adhesive fabric 10. A length of fabric substrate 11 is fed continuously from a supply (not shown) past two extrusion heads and to a take-up reel (not shown). The first head 16 extrudes the silicone elastomer to form a film of barrier 12 coating the fabric substrate.



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In one embodiment, before reaching the second head 17 the barrier material 12 is cured by the application of heat and so is prepared to be coated with the adhesive silicone gel.

The second extrusion head 17 supplies the adhesive gel 13. A thin coat of gel is extruded on top of the barrier material 12 as it moves past the second extrusion head.

The silicone gel is then cured by the application of heat. A release paper (not shown) is preferably laid upon the silicone gel layer during passage of the adhesive fabric to the take-up reel to enable the fabric to be wound upon itself whilst protecting the adhesive.

In an alternative embodiment, curing of the silicone elastomer does not occur between extrusion heads 16, 17. Instead, the silicone gel is extruded onto the uncured silicone elastomer 12 and both the silicone elastomer and gel are cured simultaneously downstream of the extrusion head 17.

Preferably the silicone gel is a fast curing gel, for example has a cure time of less than 10 seconds. In its uncured state the adhesive silicone gel has a low viscosity. Without first coating the substrate with the barrier the silicone gel would penetrate through the fabric substrate. This would undesirably result in silicone gel being exposed on the uncoated side of the fabric substrate and thus undesirably render it sticky to the touch. This problem increases in proportion to the amount of silicone gel applied.

The construction of the adhesive fabric 10 avoids this problem and enables a fabric to be produced having only one adhesive side with the other side



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remaining unaffected by the adhesive gel irrespective of the amount of gel being applied.



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## CLAIMS

1. A hose having a tubular body formed from a fabric, the tubular body having at one end a leg opening, the fabric in the region of the leg opening being provided with an adhesive coating capable of adhering to the skin of a wearer.

2. A hose according to Claim 1 wherein the adhesive coating is formed into a band which extends circumferentially about the leg opening.

3. A hose according to Claim 2 wherein the band extends continuously around the entire circumference of the leg opening.

4. A hose according to Claim 1 wherein the adhesive coating is formed into discrete regions spaced about the circumference of the leg opening.

5. A hose according to any of Claims 1 to 4 wherein the region of fabric carrying said adhesive coating is a separate strip of fabric attached to the remainder of the tubular body.

6. A hose according to any of Claims 1 to 5 wherein the fabric carrying the adhesive coating is a knitted, woven or non-woven fabric.

7. A hose according to Claim 6 wherein the fabric carrying the adhesive coating is a knitted fabric which is knitted from non-elastomeric yarns only.

8. A hose according to Claim 6 wherein the fabric carrying the adhesive coating is a knitted fabric which includes elastomeric yarn to provide the fabric with a desired modulus of elasticity.



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9. A hose according to any preceding claim wherein the adhesive coating is formed from pressure sensitive adhesive which is permanently tacky.

10. A hose according to Claim 9 wherein the adhesive is an acrylic adhesive.

11. A hose according to Claim 9 wherein the adhesive is a cured silicone gel.

12. A hose according to any preceding claim wherein the adhesive coating defines a continuous layer of adhesive.

13. A hose according to any of Claims 1 to 12 wherein the adhesive coating defines a discontinuous layer of adhesive.



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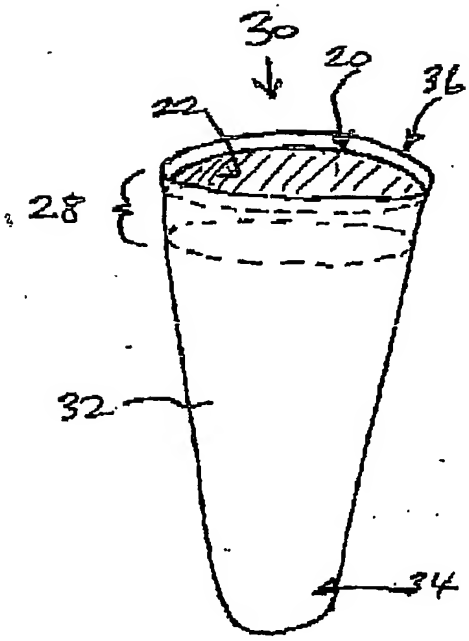


FIG 1

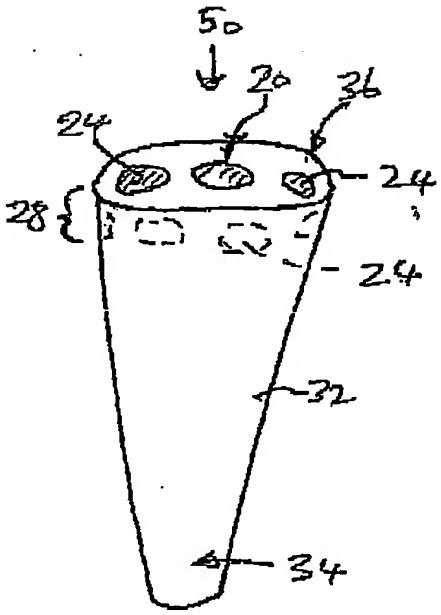


FIG 2

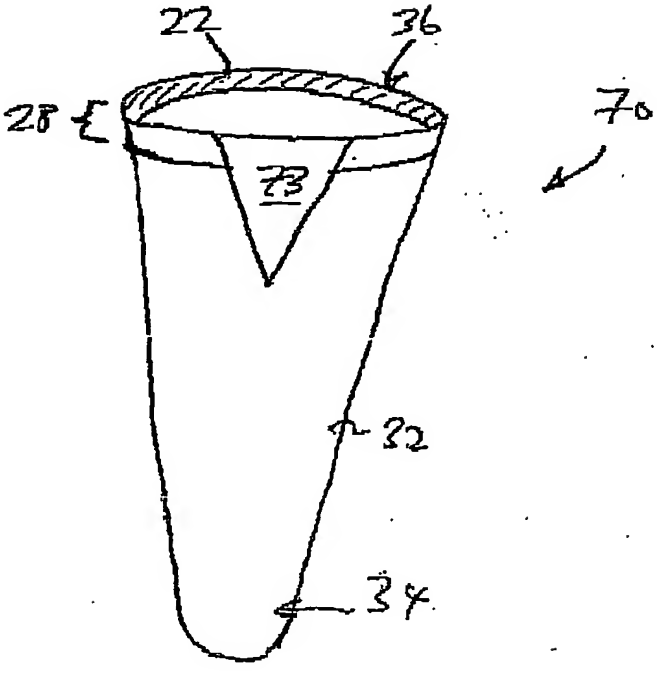


FIG 3



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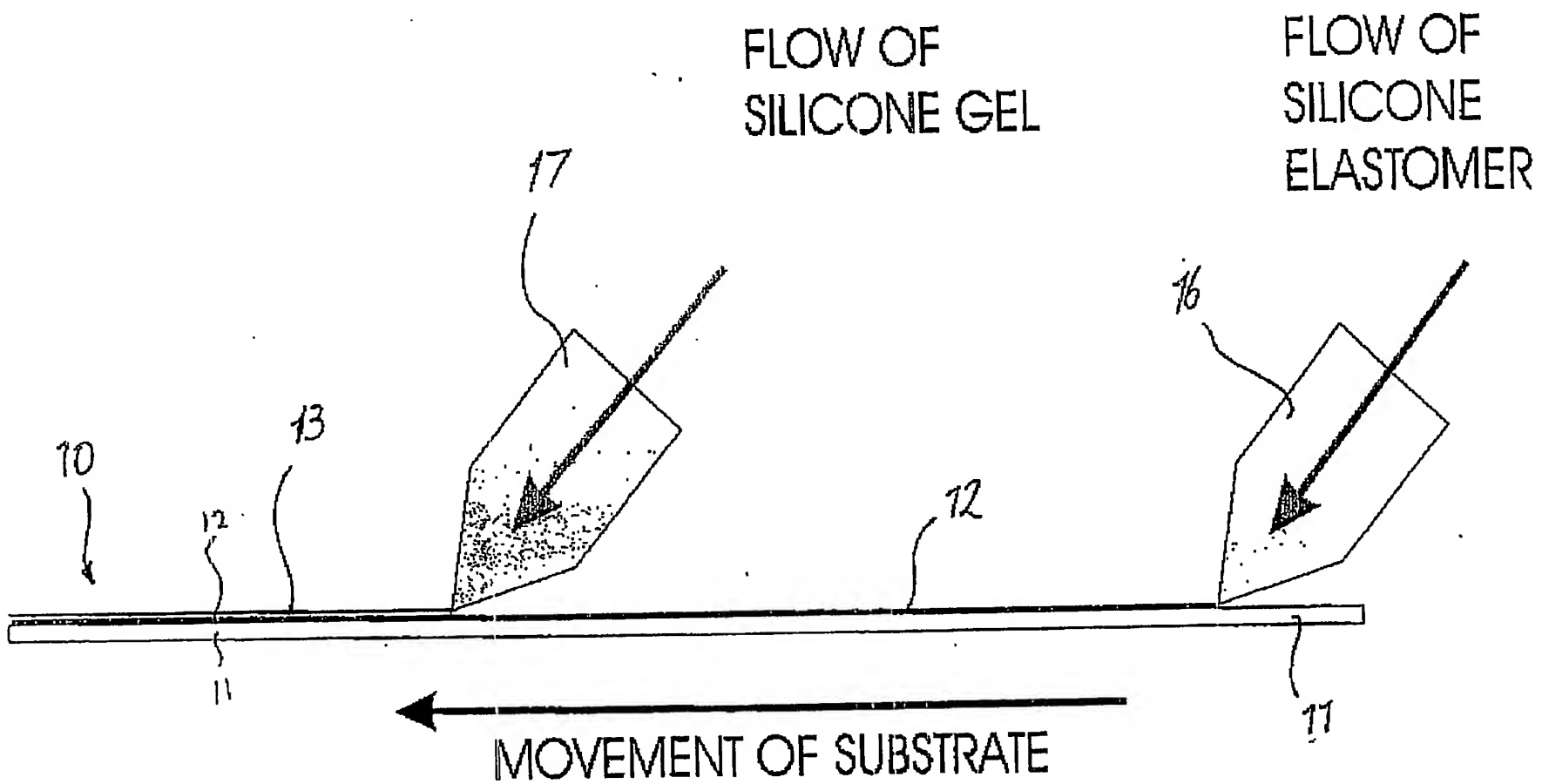
FIGURE 4

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